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ABSTRACT

Computers have brought substantial changes to schools and colleges, and the current acceleration of technological change is beginning to be seen in education. A new appreciation for technology comes at a time when education is under criticism for failing to address a rising tide of mediocrity. However, the U.S. educational system still operates with energy coming from two fundamental drives: a common interest in students and a concern by teachers to know whether their actions have had the desired effect upon their students. The strength of U.S. schools has been traditionally rooted in these interpersonal relationships and striving over time to fulfill relatively commonly held goals. Although perceptions of educational excellence relate directly to excellence in the traditional style of teaching, the new technology can be used to supplement this teaching if it can be successfully integrated into the college curriculum. Beyond the price of this new technology is the cost of humanizing the process and diffusing innovation. The reasons behind resistance to change must also be addressed, including excess uncertainty, the surprise factor, differences between new and traditional teaching methods, reflected past negative feelings, work involved in change, loss of face, and the fact that the threat posed by the change may be a real one. However, processes and techniques used in the management sector to assist in bringing about change can and should be used by educators, and with planning and communication, educational change can be effectively undertaken. (EW)

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"THE TRUE COST OF TOMORROW'S EDUCATIONAL TECHNOLOGY - MONEY ISN'T EVERYTHING"

Delivered at the Annual Conference
of the
League for Innovation in the Community College
Toronto, Canada

Dr. Peter A. Spina
Monroe Community College
Rochester, New York
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Even inveterate computer skeptics like me must admit that the expansion of technology is permeating our daily lives. I listen to the beeps of the optical scanners in the supermarket; my dry-cleaner apologized to me the other day because his computer was down so those little tags they use to identify shirts couldn't be attached - no clean shirts for me that day! When I visit our college automotive technology department, I marvel at the array of computers the students hook up to the cars, and wonder at the variety and accuracy of the diagnostic information they supply. The term grease monkey with all its erstwhile connotations hardly applies to this generation of electro-computer automotive technicians!

Computers drive and monitor all our engines and machines and are increasingly prevalent in managing our burgeoning service sector.

But why should I be surprised at the proliferation of these machines? Years ago I heard Alvin Toeffler argue in his The Third Wave that the future will bring with it a wholesale reordering of our institutions, our ways of governing, our family relationships, and our methods of producing goods and services. He wrote of an emerging civilization that...

> "will contradict the old traditional industrial civilization." He envisioned a third wave which would include, among other things, "radically changed schools."

It is these radically changed schools I speak of today focusing not on the promise of technology (it is already delivering on its promises), but on the changes it produces in our colleges and how we can adjust to these with a minimum of uncertainty, stress and resistance.

But first a note to other techno-skeptics: even if we desired, we could not reverse the onward rush of technological innovation. The computers, the microchips and the satellite systems will be with us, inevitable as the proverbial death and taxes.

The last few years have witnessed especially dazzling revolutions in scientific theory and quantum-leap advances in the translation of theory to practice.

We've seen the Jarvik heart, the Utah arm, the super-computer, even a micro-rotorooter programmed to ream out clogged arteries. We've built mobile, self-programming computers with microminiturization and voice recognition. We can now talk to inanimate machines and

tell them what to do and they can tell us what to do. But this amazing technological era is just beginning - it's momentum is only gathering; its floodgates are beginning to open.

Centuries ago, Henry Adams wisely postulated that: "The law of acceleration...is definite and constant as any law of mechanics, and cannot be supposed to relax its energy to suit the convenience of man."

This law of acceleration - a corollary of the technological age - is beginning to apply to education. We educators are beginning to see ways for instructional technology to enhance students'

performance, increase our teachers' effectiveness and help us develop better schools. First we need to understand what technology can do to help us perform better; and then, very importantly, we need to find the ways to properly integrate that technology into our systems.

And this is happening not a moment too soon. Former Secretary of Education, Terrel H. Bell's, comments on the now famous report "Nation at Risk" have a menacing ring:

> "Our nation <u>is</u> at risk", he exclaimed, "our once unchallenged preeminence in commerce, industry, science, and technological innovation is being overtaken by competitors throughout the world...The educational foundations of society are presently being eroded by a rising tide of mediocrity that threatens our very future...

> Others are matching and surpassing our educational attainments...We have, in effect, been committing an act of thinking, unilateral educational disarmament."

We community college educators join in the national lament over the steady decline in SAT scores as we enroll - indeed embrace - high school graduates who cannot properly read or write. To give these students a fair chance to obtain an appropriate higher educational credential (which they will certainly need to become productive future American workers and citizens), we have had to set up extensive, expensive remedial programs.

Again, not a moment too soon - John Sculley, President and Chief Executive Officer of Apple Computers, Inc., as well as other critics (gentle and

otherwise) are exhorting us to do much better. Among other things, they want us to succeed in transforming a generation-and-a-half of educational nonperformers into a technically competent and communicationally skilled cohort which will be the bulwark of a modern workforce. Talk about a challenge!

Management expert Lewis J. Perelman, articulates three critical points which starkly frame the future for us educators:

1. Our businesses must become more competitive in the international marketplace. Signs abound that American products are being soundly whipped in the marketplace, not only because of the wage/cost disparity issue, but also because our industrial productivity and quality control have diminished. As I speak, 40% of the parts of American-made goods are manufactured

offshore - a sobering thought to be sure! But to compete, our workers' skills will have to be dramatically enhanced Perelman says either "...by a restructured education system or by alternative means;" What he's saying is that if we educators can't do it, somebody else will.

2. Total educational costs per pupil, in constant dollars, he says, have risen nearly 400% since the early 1950's, without any evidence of a proportional improvement in scholastic performance. "The inescapable conclusion," he posits, "is that the productivity of education has been declining;"

3. Three of four people who will comprise the American workforce in 2002 are working today. But between 20% and 40% of our current adult population is functionally or marginally illiterate. And on top of that, half our workforce will require substantial retraining or re-education every five to seven years, either to remain competent in current jobs, to keep up with incessant technological changes, or to make the career shifts which will increasingly characterize our future work world.

Futurist David Pearce Snyder strikes a similar chord when he notes that one-quarter of our current work force will be required to change careers, and another quarter will have to be substantially retrained to keep

their jobs. Higher education, therefore, is becoming a life-long learning process rather than a function of young adulthood. We are now inextricably linked to that amorphous but critically important relationship between "economic development" and "human resource management."

We are in the midst of a revolution where end goals are still unknown, but change is everywhere - a very unsettling yet exciting era, one of great challenge for community colleges.

But in dramatic counterpoint, Lewis Rhodes, Associate Executive Director for Leadership and Technology of the American Association of School Administrators, asserts that our educational system still operates traditionally with its energy coming from two fundamental drives: a common interest in students and a concern by teachers to

know whether their actions have had the desired effects upon their students. The strength of our schools has been traditionally rooted in people interrelating with one another, and striving over time to fulfill relatively commonly held goals.

The educational gains - which have been considerable - in this American "system" have resulted from these relationships. People learn from people. People perform for people. People strive and endure for people. Traditions and patterns which flow from this connection, consciously or not, provide our professional sustenance. Persisting traits, habits, and teaching styles, create a palpable educational identity from which it is difficult to separate. The face-to-face interactions which have characterized our classrooms since before Socrates have created an enduring climate of learning and trust - other

learning modes do not yet carry that relationship. Teacher union leader Albert Shanker observed that among the professions ours has outwardly changed the least. Modern doctors', lawyers', and accountants' offices are bastions of high technology, replete with computers and electronic devices, while the teaching and learning environment in many of our classrooms and laboratories remains similar to what it was generations ago.

Our style of teaching then is a tradition, a benchmark, and our perceptions of educational excellence relate directly to excellence in that style of teaching.

Yet an uncomfortably large number of students do not successfully complete our educational programs; perhaps our teaching formats do not work for them. Although we

are far from understanding the learning process, many researchers have noted individuals' preference for different teaching styles. Since remaining competitive demands a highly educated workforce and, given the familiar demographics, just about everybody will be needed for work, we can no longer suffer an educational system in which so many young people experience abject and early failure. Should we wonder that our policymakers are tasking us to improve the process, reverse the educational downturns and provide educational success for groups which have heretofore not experienced it?

But we educators are being toed to these marks at a very difficult time. We will be dealing with the largest and most diverse student clientele in our history, with marginal fiscal resources; and soon, unless there is a transmogrification of national human resources policy,

with a numerically diminishing teaching cohort. Given these certainties, ladies and gentlemen, the classical face-to-face educational interaction - the teacher with his/her piece of chalk and lecture notes talking to 30 students of widely divergent circumstances - will not entirely cut it. The computer and its accompanying technology will be called upon now do for the mind of man what the engine did for his muscle, comments Stephen White of the Sloan Foundation.

Now I am not arguing that the traditional face-to-face interaction between teacher and student will go the way of the dodo. Quite the opposite: that style will be important in dealing with students who have special needs. One of the great strengths of instructional machines is that they are dispassionate and non-judgmental; but that is also a significant weakness. Students need hands-on, caring personal reinforcement.

But as we learn more about learning, it seems clear that a mix of teaching styles will be required to meet the increased expectations of a society which strives to enlist every citizen as a productive participant.

Because, however, of our decreasing competitiveness, I believe we are in a catch-up-ball situation, and new technology-based teaching methods should be integrated in our classrooms sooner rather than later. The calls for increasing student productivity as measured by student outcomes are here to stay, and those folks who fund us will keep us focused on them. We in the community colleges will find ourselves especially challenged to demonstrate what we proclaim as our trademark: access with excellence. Since so many of

the hard-to-educate population will enroll in our programs, we will be hard-pressed to reduce student attrition. Technology can be our major ally in the battle against attrition.

Albert Shanker admits that "it will be virtually impossible to modernize our schools, to increase their efficiency and productivity without a major application of technology to education."

As the title of my remarks suggests, the real difficulty in advancing technology lies in integrating it into our college classrooms. Beyond the price of computers, software, satellites and videos is the cost of humanizing the process and diffusing innovation.

The process involves temporarily backgrounding the "set-up" expenses of the new technology (difficult for us administrators) and focusing first on the basic human values and behaviors of the learning interacters--the student and the teacher.

The game-plan for addressing people's values and needs is to first offer them persuasive information about the need for change, about the criteria that guide change, and then to show them what they have to gain from buying into classroom technology. By doing so, we hope to reduce misunderstandings, misinterpretations and residual fallout.

Yet, regardless of the precautions taken, resistance to change <u>will</u> surface. And no matter what the change: classroom or office remodelings, changes in information systems, staff reorganization, or the more substantial

issues of changes in pedagogy brought about by the introduction of classroom technology. Resultant changes will be accompanied by tensions, confusion, uncertainty - all characteristics of resistance.

C.F. Kettering, the American industrialist, once said that the "the world hates change, yet it is the only thing that has brought progress." Resistance to change is sometimes a distress signal from individuals who find themselves impelled in a direction they don't fully understand and hence feel uncomfortable. Thoreau's observation about change is timeless: "things do not change;" he said, "we change."

Change then, it would appear, requires a humanization process, one in which we must look beyond personal resistance as the only problem to be addressed. The promise of new instructional technology is so seductive

that we must take care not to restrict the search for solutions to the technology itself. The machines can't provide all the answers. The real roots of resistance often lie elsewhere--within our psyches.

We administrators must remember that by asking our faculty to consider changing their teaching techniques, we are asking them to change the very core of their enterprise--not an easy task!

What then are the most common reasons for resisting change and how can we deal with them?

Yale sociologist Rosabeth Moss Kanter in an interesting article entitled "Managing the Human Side of Change" listed several reasons why people resist change.

Heading her list is the loss of control. The way people handle change depends upon whether they feel in control of it or not. "Ownership" is vital in getting commitment to action, Kanter says. If people have a chance to participate in decisions, they feel better about them. It is powerlessness that corrupts, not power. When people feel disenfranchised, they feel out of control. Consequently, they can act irrationally, and can tend to grab fast to every piece of their world they can control. Attitudes harden and trouble may ensue. Dale Parnell, president of the AACJC, tells of the faculty member he interviewed who said he was not against progress as long as it didn't change anything!

Yet, replicated studies have demonstrated that when people's affective needs have been considered and they have been allowed to actively participate in a change issue, the result has been an acceptance and a willingness to change attitudes, rather than a solidification of existing attitudes.

The editors of Management Review recently stated that "when you get people - whatever their level - in on the planning, permit them to participate in the creation, and allow them to see the end results of the planning, it becomes a new and different ball game...When people are involved they have a different stake in the change."

According to Kanter, a second reason why people resist change is excess uncertainty. Teachers simply may not know how technological advances will affect them and their teaching practices. Their attitude toward change, therefore, is one of uncertainty, they may feel apprehensive, they postpone action. This is a variation on the old saw: "It's safer to stay with the devil you know than to commit yourself to the devil you don't." I tell a sardonic story that illustrates the point of postponing action. A divorce lawyer was surprised to see a very elderly couple seated before him. "I don't understand this," he said, "madam, you're 90, your husband is 92, you've been married for more than 60 years and your're seeking a divorce. Why now?"

The elderly woman reflected and replied thoughtfully: "Well, you see, we've thought about this for a long time, but we wanted to wait until all our children were...dead!"

Another reason why people resist technological change is the surprise factor. As Kanter describes, individuals generally do not take well to decisions and changes which are suddenly sprung upon them. Their initial response to something they have had little time to prepare for mentally, is often negative. Therefore, it is important not only to provide information for faculty, but also to arrange for the proper timing of its release.

People also resist technological change because of what Kanter terms the "difference" phenomenon. To successfully introduce change we must try to reduce the

"differences" inherent in the change, leaving intact as many residual habits and routines as possible. For example, the introduction of instructional technology may modify the traditional face-to-face interactions teachers enjoy with students. This is a style that has heretofore successfully resisted attempts to change it. (Remember team teaching and buzz groups?) Hence, enlisting faculty consideration for changing this traditional approach will more likely be well-met if it is presented as complementary to tradition. The challenge is to minimize the differences between this traditional teaching format and the new ones which are sure to follow.

A very telling resistance factor is the loss of face. As Kanter states, "...if accepting a change means admitting that the way things were done in the

past was wrong, people are certain to resist. No one likes losing face or feeling embarrassed in front of their peers."

Sociologist Erving Goffman commented on the power of face-saving saying people will go to great lengths to save face, "even engaging in actions contrary to their long-term interest to avoid embarrassment."

A workable change strategy is to put the change into a context or perspective. First, we administrators must convince teachers that technological changes are necessary to ensure that we remain competitive. Change is not an option, we must convince them, it is a societal imperative. Second, we administrators must be convincing that we uphold the quality, value, and relevance of our educational enterprise, especially classroom teaching. State-of-the-art learning is as

strategically critical to a knowledge-based, post-industrial country as steel was to a materials-based, industrial economy. What we should say to our faculty is this: what you do is vital, but the lofty goals for student success society is rightfully demanding require that many teaching strategies be employed. By approaching change in this way, individuals may not see themselves losing face by changing; just the opposite. They will appear - even to themselves - as understanding, flexible, proactive and, above all else, valuable members of our society whose administrations are critical to our nation's success. "The world seldom notices who teachers are, but civilization depends on what they do," says our colleague Bill Stewart in his book Management by One-Liners.

Some of us resist change, says Kanter, because we are concerned about our ability to be effective after the change. Will we have the same personal impact on our students once new technological strategies have been implemented? Will we be as good after we modify our style of teaching?

No one likes to look inadequate, especially teachers who have taught for a long time. They do not want to feel that they have to start over again in order to feel competent.

In orchestrating change, eventual success will depend heavily on the training we provide for our teachers so they will have all the necessary information to understand and become facile with new techniques. Wise

administrators will know that everyone needs time to experiment without being judged or evaluated so that they will not appear foolish in front of their peers and colleagues.

One reason why I believe that technology has not yet achieved its full potential in our college classrooms is that not enough high-quality training is being offered to the people who will use that technology. A recent study, cited in John H. Sununu's article, "Will Technologies Make Learning and Teaching Easier?", found that while 96% of the U.S. school districts were using technology to improve instruction, only 14% had developed policies about how they planned to use the technology and to train their teachers. I am not aware of a similar survey conducted in higher education, but if one were done I believe the results would be similar.

Changes in the work place can have a rippling effect and can disrupt other plans, projects, or even workers' personal activities. One of my Rochester colleagues, Dr. Dorothy Paynter, director of human resources at RIT, illustrated this very well: "...even a positive change can signify a loss. It means giving up the familiar, the comfortable."

Although some of these factors are seem unrelated to technological changes in the classroom, they can have a pronounced effect on work performance. My own personal experience, is that the workplace is a very important part of contemporary employees' life. Success in one's career is very important in our culture, often every bit as important as success in personal relationships including marriage and childraising. Changes in the workplace then can have the same impact

as changes in personal status. The perceptive change agent must sense the potency and disruptive impact of the changes and directly address them. The success of accommodating change, then, is partly contingent on the sensitivity of the leaders.

Another factor producing resistance to change is simply that change is more work (Kanter). Teaching in community colleges - already one of the most demanding teaching roles - will be further complicated if routines and old habits are to be changed. Change can, and almost always does, require more energy, more time, and greater mental preoccupation, especially in the implementation phase.

After all, new strategies must be learned before they can be adopted in the classroom. If there is any hesitancy or uncertainty on the learner's part, a

greater surge of energy is needed to overcome this resistance in order to make the changes work. Winston Churchill made a wise comment to this effect: he said, "Personally I am always ready to learn, although I do not always like being taught." Teachers need support and understanding to encourage them to expend the extra energy required to move from tradition to resistance to commitment. Such support should be not only of the moral variety but should involve resource expenditure - the proper training costs money but it will be well spent.

Another reason people resist change is that their reflected past negative feelings get in the way of future progress. Kanter explains that unresolved unrelated past difficulties may surface to entangle and hamper the change effort. Teachers who feel they were

unjustly treated in the past, neglected - even benignly - or improperly required to modify their professional prerogatives, when confronted with a change opportunity, may resist. The true cost of leading technological changes may be to recognize and deal with anger, resentment or confusion, and listening to past frustration and repairing past rifts. That being so, I believe the sine qua non for accommodating change of any kind is that a genuine spirit of trust exists between workers and managers. Each must believe in and value the importance of the other. No hidden agendas can exist if relationships of trust are to be established. Change will be almost impossible to implement in a climate of mistrust.

Finally, Kanter suggests that individuals resist change because -"sometimes the threat posed by the change is a real one." Sometimes as a result of the change - a

teacher's influence on student learning doesn't appear quite as direct. It would be naive to imagine otherwise. All of us may lose something in a change, and some of us may be more negatively affected than others. In his brilliant defense in the Scopes Monkey trial, Clarence Darrow illustrated the price of progress and used the invention of the telephone as an example.

What a wonderful thing this device that brings people together no matter how far the distance. How marvelous to hear the voice of a loved one, to share in the joys of their accomplishments. Yet this same machine when it rings in the middle of the night makes our heart skip a beat. And what has the telephone done to our privacy?

The bottom line running through all of these points is that in order to get people to accept change we must communicate effectively. There is a need for planning,

for providing advance notice, for ensuring that those affected understand the underlying reasons for the change for sophisticated training. But the most vital change strategy is involvement. The kind of dramatic change issued in by the computer phenomena is not one that can be legislated by state education departments or mandated by well-meaning college presidents or deans. But given the national imperatives I have mentioned, it is not one certainly that can be ignored, nor can it even be "committed" and studied into submission. Many of you people are here today because you have learned or are learning about the ways in which the computer and its related technology can enhance your teaching and, therefore, the learning of your students. If my remarks are to have any pertinence, I hope you will carry them to your colleagues back home. We need

more of them to understand the wonders of modern instructional technology and how it can make our difficult jobs a little easier and, perhaps, a great deal more satisfying.

I close with an ancient proverb which encapsulates much of what I have said this afternoon:

> "Tell me, I forget; show me, I remember; involve me, I understand."